Levard C., Rose J., Masion A., Doelsch E., Borschneck D., Bottero J.-Y. Role of natural nanoparticles, imogolite and allophane, on the mobility of trace metals in soils from La Reunion Island. French-American Young Engineering Scientists Symposium, 7-9 July 2008, Washington, USA.

This research adresses the sensitive field of waste management in an insular context. The case of the Reunion Island bears some aggravating factors making the waste management an even more sensitive subject: 1) it is a small island with a fast growing population and associated activities 2) the agricultural soils (mostly andosols) have an elevated natural concentration of trace metals. An inexpensive form of waste management is to reuse agricultural- waste (especially pig manure) as fertilizer. However, reuse of waste, may modify physico-chemical conditions and trace elements can be released from the soils. The accuracy of the prediction of metal fluxes in soils will be greatly enhanced by a detailed knowledge of the pollutants' speciation, which controls their mobility, toxicity and ultimately their bioavailability. Although the trace metals Cu, Ni, Zn selected for this study because of their occurrence in the soils and wastes, may bind to numerous components of the soils (clays, Fe and Al oxides, organics), we chose to focus on 2 types of nanosized alumino-silicates: the tubular imogolites (2nm diameter) and the spherical allophane (3-5nm). The choice of these phases is justified by their high abundance in the andosols of the Reunion, and their suspected high reactivity arising from the presence of -SiOH and -AlOH at the surface of structures whose specific surface area can reach 700m2/g. Here we detail using a molecular approach the types of the binding mechanisms between pollutants and natural occurring nanoparticles.